

1/21

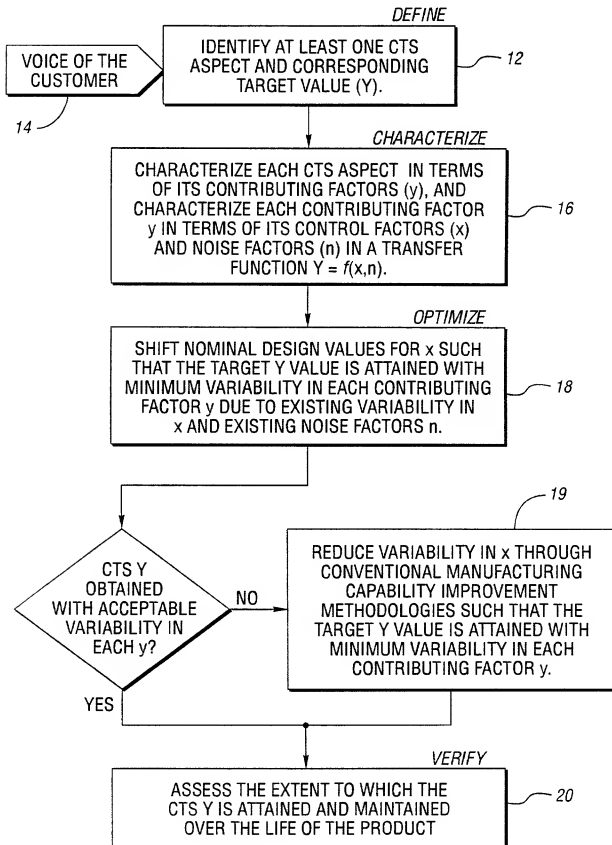


Fig. 1

2/21

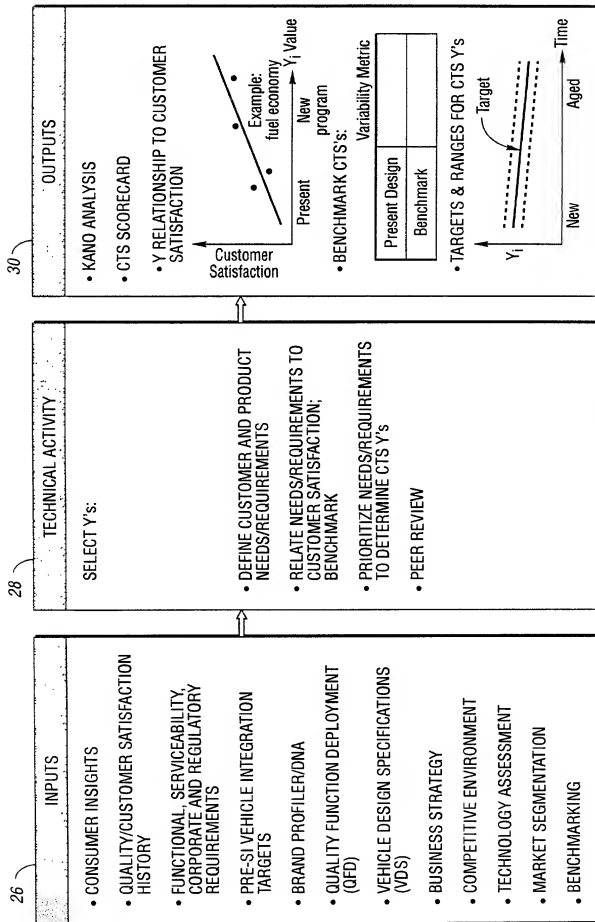


Fig. 2

3/21

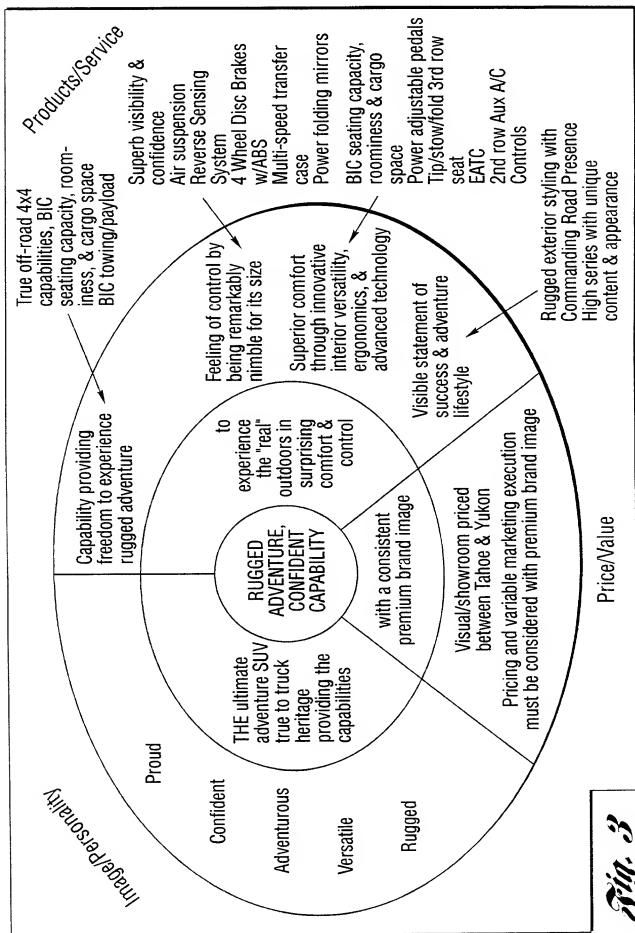


Fig. 3

4/21

ATTRIBUTE	ATTRIBUTE CLASS	PRIORITY (RANK)	PRIMARY BRAND POSITIONING	NAMEPLATE BRAND POSITIONING	PROGRAM SPECIFICS		PRESENT NAMEPLATE ENTRY
					TARGET OBJECTIVES	STATUS	
USAGE EXPERIENCE							
INTERIOR ROOMINESS	D	1	L A C M	L A C M	L A C M	L A C M	L A C U
ERGONOMICS/FLEXIBILITY/COMFORT	D	2	L A C M	L A C M	L A C M	L A C M	L A C U
LUGGAGE/CARGO SPACE	D	3	L A C M	L A C M	L A C M	L A C M	L A C U
DURABILITY/CRAFTMANSHIP	D	6	L A C M	L A C M	L A C M	L A C M	L A C U
QUIETNESS	I	8	L A C M	L A C M	L A C M	L A C M	L A C U
EASE OF ENTRY/EXIT	I	11	L A C M	L A C M	L A C M	L A C M	L A C U
RANGE/FUEL ECONOMY	G	15	L A C M	L A C M	L A C M	L A C M	L A C U
CLIMATE CONTROL	G	17	L A C M	L A C M	L A C M	L A C M	L A C U
EXTERIOR VISIBILITY	G	20	L A C M	L A C M	L A C M	L A C M	L A C U
COST OF OWNERSHIP	G	25	L A C M	L A C M	L A C M	L A C M	L A C U
DRIVING EXPERIENCE							
PERFORMANCE/TOWING	D	4	L A C M	L A C M	L A C M	L A C M	L A C U
RIDE	I	9	L A C M	L A C M	L A C M	L A C M	L A C U

Fig. 4

5/21

% SATISFACTION vs. RELATIVE LEVERAGE

RELATIVE LEVERAGE Median	IMPROVE... HIGH LEVERAGE ON OVERALL SATISFACTION, FEWER CUSTOMERS SATISFIED	SUSTAIN/BUILD... HIGHER LEVERAGE ON OVERALL SATISFACTION, MORE CUSTOMERS SATISFIED
	REVIEW... LOWER LEVERAGE ON OVERALL SATISFACTION, FEWER CUSTOMERS SATISFIED, PAY PARTICULAR ATTENTION TO DISAPPOINTMENTS	MAINTAIN... LOWER LEVERAGE ON OVERALL SATISFACTION, MORE CUSTOMERS SATISFIED

Median
% HIGH SATISFACTION

Fig. 5

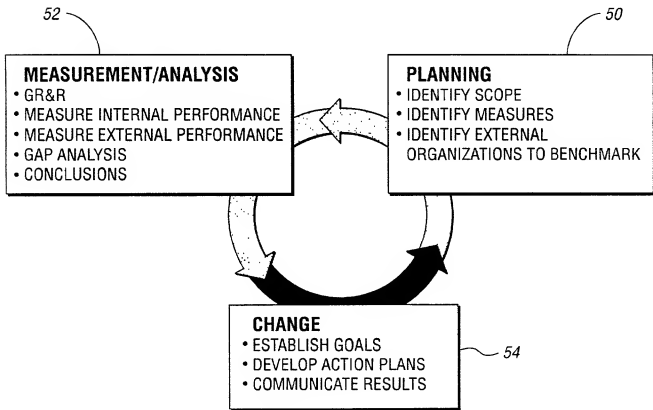


Fig. 6

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6/21

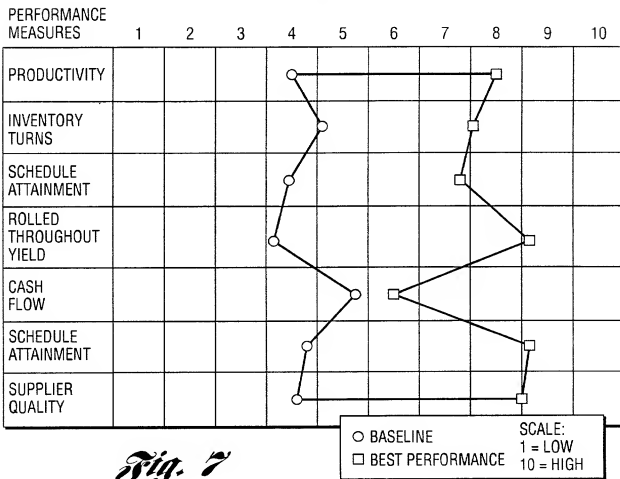


Fig. 7

KANO ANALYSIS

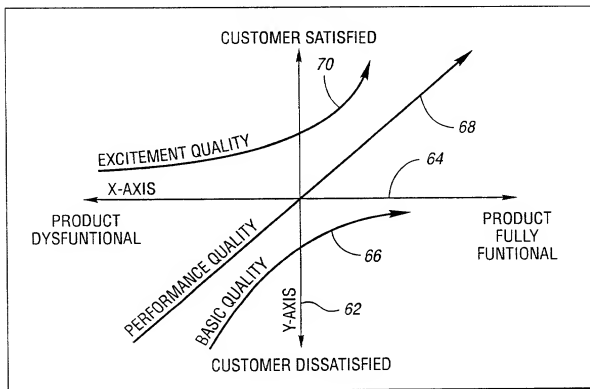


Fig. 8

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7/21

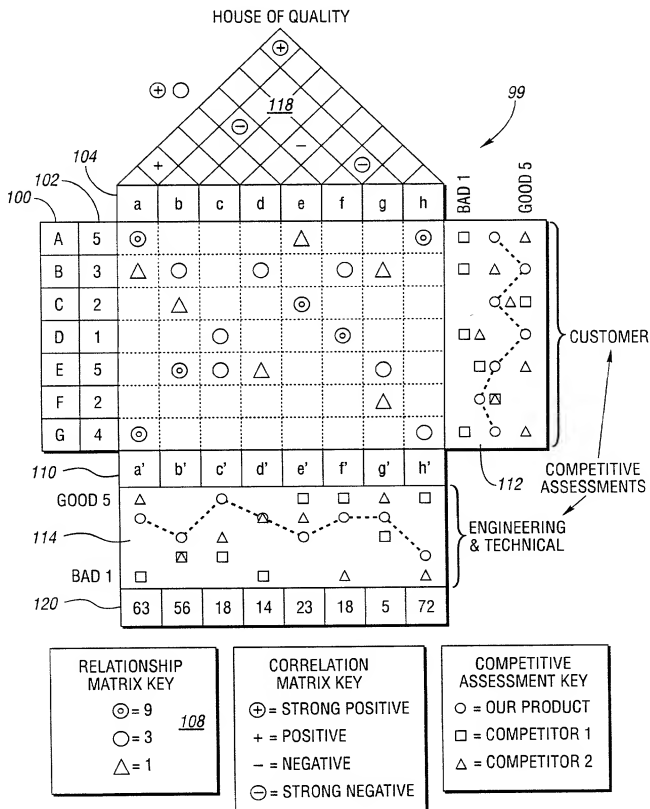


Fig. 9

8/21

Critical to Satisfaction (CTS) Scorecard

Attribute: _____
 Project Description: _____

Status of Items Critical to Satisfaction and Relationship to Customer												
CTS or Surrogate	Units	T.F. ? Y/N	Status		Competitor/BIC		Target: initial Condition		Target: Aged		Associated Cust. Sat. Improvement	
			mean: μ	s.d.: σ	mean: μ	s.d.: σ	mean: μ	s.d.: σ	mean: μ	s.d.: σ		
<u>140</u>	<u>142</u>	<u>144</u>	<u>146a</u>	<u>146b</u>	<u>148a</u>	<u>148b</u>	<u>150a</u>	<u>150b</u>	<u>152a</u>	<u>152b</u>	<u>152c</u>	<u>154</u>

Fig. 10

9/21

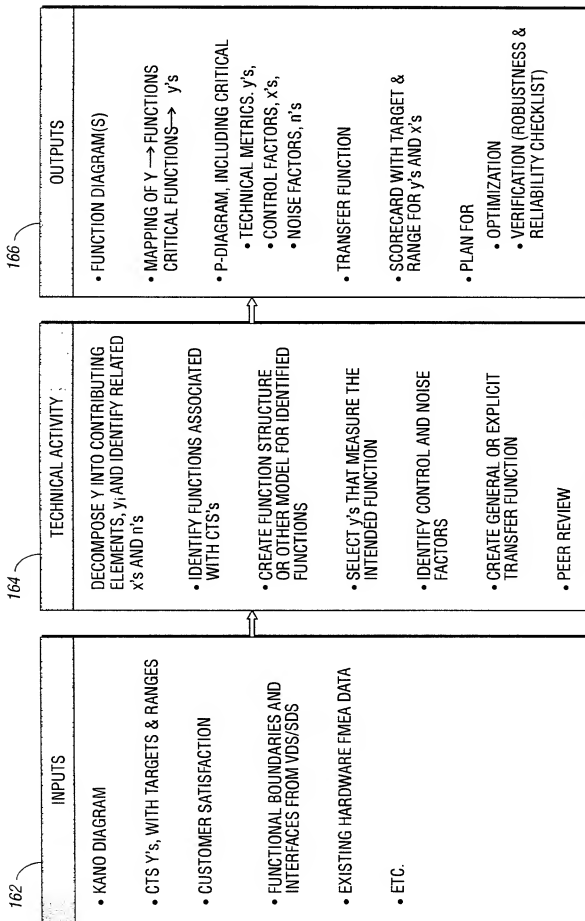


Fig. 11

160

10/21

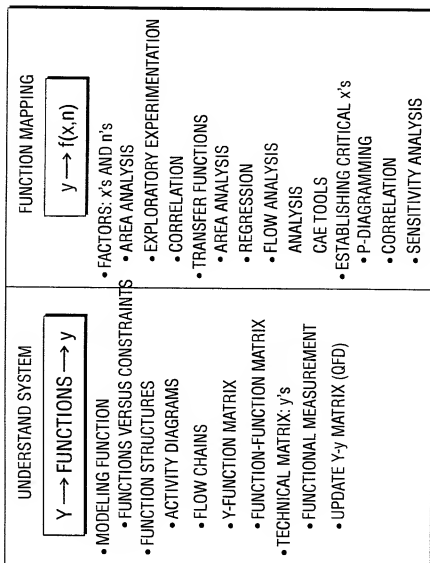


Fig. 12b

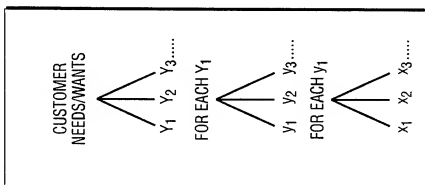
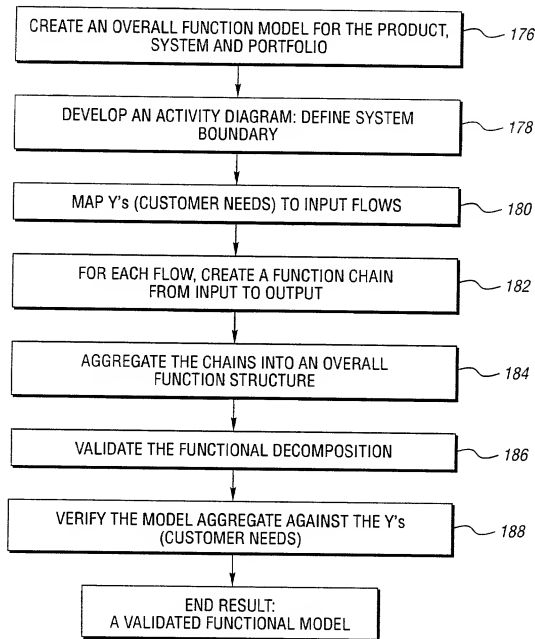


Fig. 12a

11/21



174

Fig. 13

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12/21

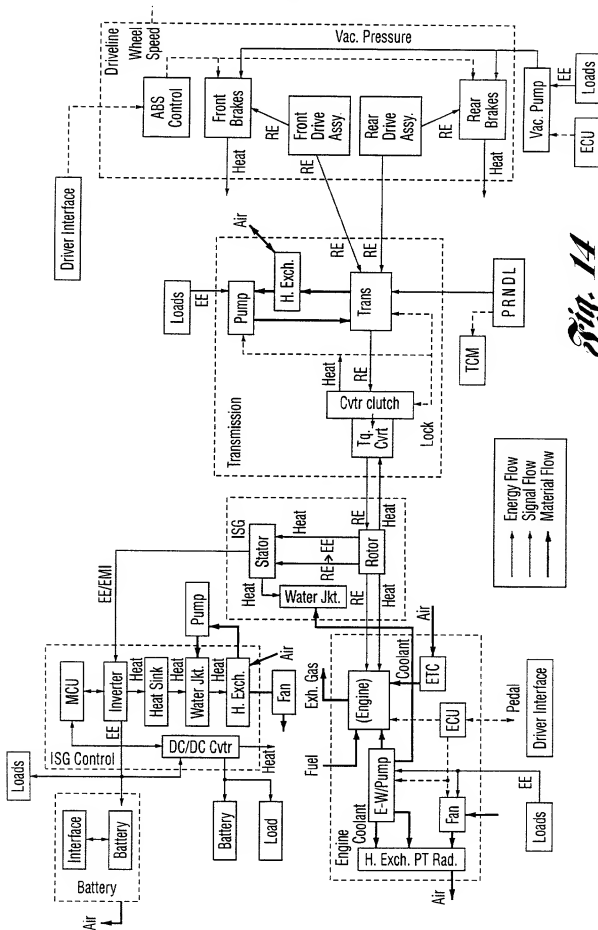


Fig. 14

13/21

TRANSFER FUNCTIONS

- A QUANTITATIVE RELATIONSHIP BETWEEN DEPENDENT AND INDEPENDENT VARIABLES THAT CAN BE EXPRESSED AS AN EQUATION OF THE FORM

$$\left. \begin{array}{l} Y = F(y_1, \dots, y_n) \\ \text{OR} \\ y = f(x_1, \dots, x_n) \end{array} \right\}^{190}$$

- ACTUAL TRANSFER FUNCTION MAY LOOK SOMETHING LIKE THIS

$$\left. \begin{array}{l} Y = \alpha \sin y_1 + \beta \cos y_2 + \gamma y_3, \\ y = \beta_0 + \beta_1 x_1^{\alpha_1} + \beta_2 x_2^{\alpha_2} + \beta_3 x_3^{\alpha_3} + \lambda_1 n_1, \\ \text{etc.} \end{array} \right\}^{192}$$

Fig. 15

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14/21

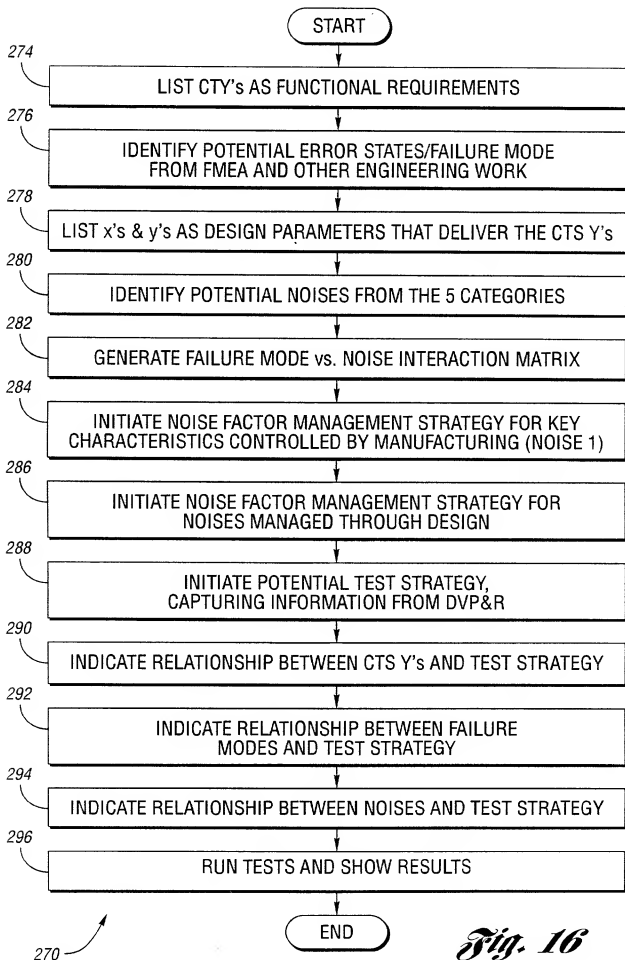


Fig. 16

15/21

PROGRAM		Design Parameters										Test Name									
System/Sub-system/Component		1	2	3	4	5	6	7	8	9	10	CAE/Comp./Subsyst./System/Vehicle									
		1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	
Reliability & Robustness Checklist		302										312									
Functional Requirement Life Target (for the subject component/system)																					
CTS # 1:																					
CTS # 2:																					
CTS # 3:																					
CTS # 4:																					
CTS # 5:		298										314									
CTS # 6:																					
CTS # 7:																					
CTS # 9:																					
ERROR STATES/FAILURE MODE -potential TGM, negated function and/or "noises" for other sub-systems																					
G																					
F																					
E																					
D																					
C																					
B																					
A																					
Show interactions between Failure Modes and Noise Factors																					
300												316									
NOISE FACTOR MANAGEMENT																					
Cat: Strategy																					
I: Change technology																					
II: Apply Parameter Design																					
III: Upgrade Design Spec																					
IV: Reduce/Remove Noise																					
V: Add Compensation Device																					
VI: Disguise/Divert																					
Testing Strategy Followed: i.e., Test-to-Failure, Degradation, DOE, etc...																					

Fig. 12a

318

Fig. 126

310

308

306

17/21

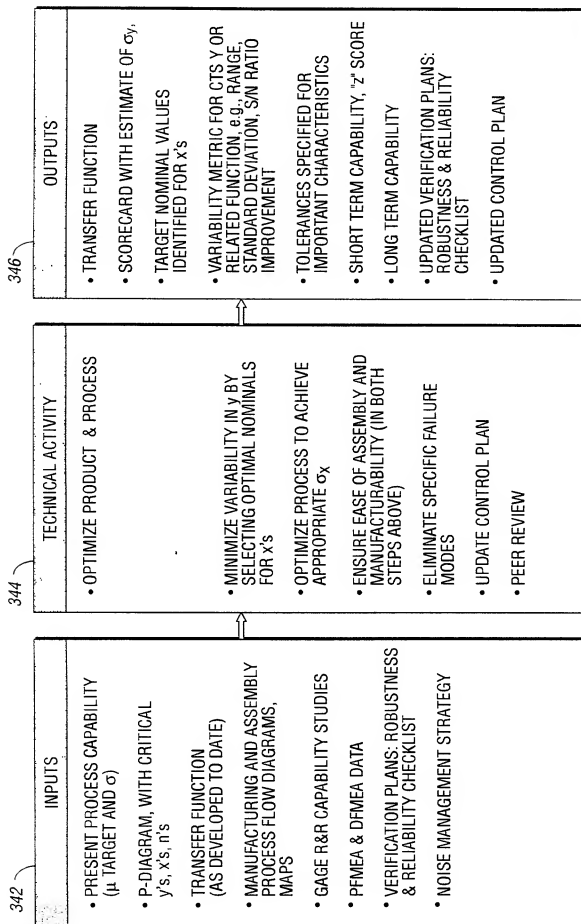
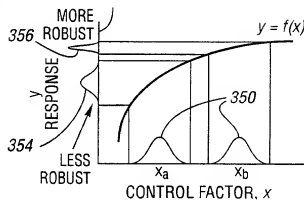
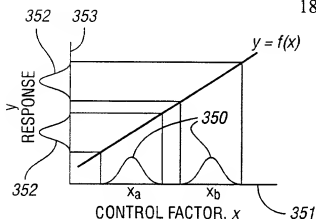


Fig. 18

340

18/21



"SHIFT"

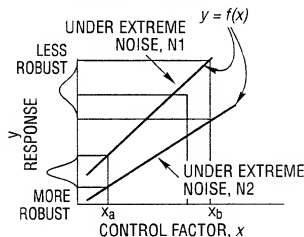
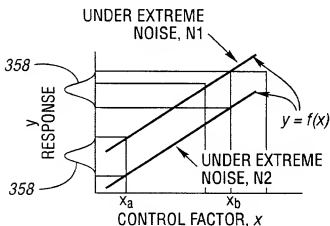
- WHEN $f(x)$ IS LINEAR, THE NOMINAL VALUE OF THE CONTROL FACTOR x HAS NO EFFECT ON THE VARIABILITY OF THE RESPONSE, $f(x)$.
- CHANGE THE LEVEL OF THIS CONTROL FACTOR TO SHIFT THE RESPONSE WITHOUT AFFECTING VARIABILITY.

"SHRINK"

- WHEN $f(x)$ IS NON-LINEAR, THE NOMINAL VALUE OF THE CONTROL FACTOR x CAN HAVE A MAJOR EFFECT ON THE VARIABILITY OF THE RESPONSE, $f(x)$.
- CHANGE THE LEVEL OF THIS CONTROL FACTOR TO DESENSITIZE THE RESPONSE TO THE CONTROL FACTOR VARIABILITY.

Fig. 19a

Fig. 19b



"SHIFT"

- WHEN THE CONTROL FACTOR x DOES NOT INTERACT WITH THE NOISE, THE NOMINAL VALUE OF x HAS NO EFFECT ON THE RESPONSE VARIABILITY.
- CHANGE THE LEVEL OF THIS CONTROL FACTOR TO SHIFT THE RESPONSE WITHOUT AFFECTING VARIABILITY.

"SHRINK"

- WHEN THE CONTROL FACTOR x INTERACTS WITH THE NOISE, THE NOMINAL VALUE OF x CAN HAVE A MAJOR EFFECT ON RESPONSE VARIABILITY.
- CHANGE THE LEVEL OF THIS CONTROL FACTOR TO DESENSITIZE PERFORMANCE TO THE NOISE AND SHRINK THE RESPONSE VARIABILITY.

Fig. 20a

Fig. 20b

10043696.031103

19/21

Vehicle/Part Name:		5.4L Engine Compression Ratio			
Description:		Compression Ratio Contribution to Engine Quietness			

Performance		Transfer Function	
Characteristic	Units	Y/N	Formula (enter here)
CR	Ratio	Y	$y = f(x, n)$

Variables			Range		Contribution
No.	Characteristic	Units	Min	Max	Sensitivity
1	Cyl Hd Cmbr Vol	cc			-0.27
2	Blk Dk Crk/Deck Cl	mm	255.91	256.04	-0.12
3	Head Gasket Thk	mm	0.97	1.06	-0.055
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					

15				
16				
17				
18				
19				
20				

Cell Shading Key	
	Enter Data
	Do not enter data (Calculation)

Confidence Ratings	
High (H)	Estimate based on customer-correlated model of same parts
Med (M)	Estimate based on partial customer correlation or surrogate parts
Low (L)	Estimate without customer correlation or no process data available

370

Fig. 21a

10043696, 031102

392

378392

390

386

Enter Formula (must refer to cells J13, J14, ... representing x_1, x_2, \dots)

Do not enter data (Not applicable for Noise Factors)

21/21

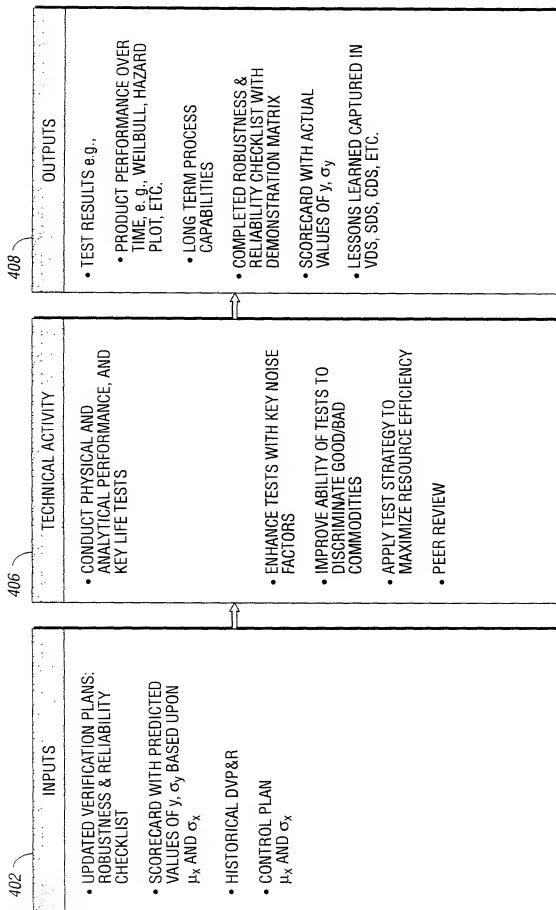


Fig. 22

400

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